

Chapter 7: Comprehensive Everglades Restoration Plan

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SUMMARY AND HIGHLIGHTS

The Comprehensive Everglades Restoration Plan (CERP) was approved by the U.S. Congress and signed by President Clinton in December 2000 in the Water Resources Development Act of 2000. The act contains a number of provisions regarding the implementation of the Comprehensive Plan, including a 50/50 cost share between the federal and state governments. Further detailed planning has begun on all six pilot projects, seven construction projects and two new feasibility studies.

The passage of Section 373.470, Florida Statute (F.S.), requires that a single report be prepared annually, tracking the progress made in the implementation of the Comprehensive Plan. The report must contain detailed financial information, as well as the status of all projects, and is to be issued January 31 of each year. The South Florida Water Management District (District or SFWMD) and the Florida Department of Environmental Protection (Department) will be working together in the coming months to prepare the report required by the statute. Accordingly, this chapter of the Everglades Consolidated Report contains a brief project status update and a more thorough discussion of Restoration Coordination and Verification (RECOVER) activities.

RECOVER is a system-wide program of the CERP designed to organize and provide the highest-quality scientific and technical support during the implementation of the plan. The restoration plan is science-based, and it is the role of RECOVER to ensure that the best available science continues to support and enhance the plan. RECOVER encourages partnerships among federal, state and local agencies, and tribal governments regarding research, monitoring and resource management in South Florida. RECOVER affords such entities the opportunity to participate in an ongoing process of adaptive assessment and refinement of the CERP. Additionally, RECOVER invites stakeholders to participate in the review of RECOVER products. RECOVER accomplishments over the past year include: the development of the RECOVER management plan, a draft Monitoring and Assessment Plan, several protocol papers and an interagency Memorandum of Understanding (MOU).

INTRODUCTION

The objectives of the CERP are the restoration, preservation and protection of the South Florida ecosystem while providing for the other water-related needs of the region, including water supply and flood protection. The intent is to implement CERP projects to ensure the protection of water quality in, the reduction of the loss of freshwater from, and the improvement of the environment of the South Florida ecosystem and to achieve and maintain the benefits to the natural system and human environment described in the Comprehensive Plan. Pursuant to USACE regulation, the Design Agreement executed between the District and the USACE in May 2000 covers activities related to planning, engineering and design of the implementation of the CERP. This agreement introduced the concept of the CERP as a program, rather than simply a series of separate projects.

In addition to the design of projects, the Design Agreement includes provisions for RECOVER. RECOVER activities are defined, but are not limited to, adaptive assessment, monitoring, peer review, development and refinement of system-level, analytical model tools and continuing review and refinement of the Comprehensive Plan. RECOVER is more fully described below.

The District and the USACE have begun design of the CERP projects, generally in accordance with the implementation schedule in the *Final Integrated Feasibility Report and Programmatic Environmental Impact Statement* (USACE, SFWMD, 1999). Project-level activities include planning, engineering, design and project management efforts specific to individual projects. Project-level activities are described, scheduled and cost-estimated in an individual project management plan for each respective project. Project management plans are being prepared for each project before initiating design work. Each plan will define the scope of the project and will provide a detailed work breakdown structure for designing the project. The plan will describe District and USACE responsibilities during the design phase and will provide a detailed schedule with milestones for the project. The emphasis in the implementation of CERP over the past year has been in the preparation of project management plans.

For purposes of the following section the projects have been grouped into three classifications: pilot projects, feasibility studies and project implementation reports for CERP construction projects. Pilot projects will seek to reduce levels of uncertainty surrounding some technologies included in the Comprehensive Plan. The results of the pilot studies will be documented in a Pilot Project Technical Data Report. Feasibility studies are the traditional vehicles by which the USACE and a nonfederal sponsor explore water resources problems and opportunities in a given planning area and formulate solutions to the identified problems. The recommendations from a feasibility study are documented in a report that serves as the decision document for congressional authorization. Due to the conceptual level of design contained within CERP, a new decision document, called a project implementation report, is envisioned. The planning and engineering design necessary to develop the individual CERP projects, through plans and specifications, will be documented in project implementation reports.

PROJECT MANAGEMENT ACTIVITIES

This section of the chapter will highlight the individual projects and the project management plans that have been completed or initiated.

Pilot Projects

Of six pilot projects described in CERP, three include the construction of Aquifer Storage and Recovery (ASR) systems. These pilot projects will be constructed along the Hillsboro Canal and the Caloosahatchee River adjacent to Lake Okeechobee. Project management plans were completed during March 2001 for two of these three pilot projects, as described below:

Western Hillsboro [Site 1] Impoundment and Aquifer Storage and Recovery: This pilot project will address uncertainties associated with ASR technology that are proposed in CERP. It will determine the feasibility and evaluate technical and regulatory uncertainties, as well as optimum design, of a facility prior to embarking upon full-scale implementation of the ASR facilities at the Western Hillsboro site and other sites in the Lower East Coast (LEC) region. The formulation of alternative pilot project designs is intended to address cost-effective means of addressing these uncertainties.

Lake Okeechobee Aquifer Storage and Recovery: This pilot project will evaluate the technical and regulatory uncertainties associated with the ASR technology near Lake Okeechobee. The project includes data collection, plan formulation, permitting, design, construction, testing, operation and reporting for five ASR systems that will store available water for subsequent recovery during dry periods. These five systems will be located at three geographically dispersed areas around Lake Okeechobee, with one of these sites being a three-well cluster to evaluate how multiple ASR systems interact with one another.

The project management plan for the third ASR pilot project, the Caloosahatchee River Basin, will be completed by the end of 2001. This project will assess the hydrogeological characteristics of the Hawthorne and Floridan aquifers and water quality in the vicinity of the C-43 Basin.

Prior to applying ASR on the unprecedented scale envisioned by CERP, hydrogeological information on a regional scale needs to be gathered. Therefore, a regional-scale hydrogeological investigation is being performed parallel to the ASR pilot projects. This regional investigation is being performed as a separate, but associated, program within CERP. Information gathered during the regional investigation will be used, along with results of the ASR pilot projects to provide options for the expanded use of ASR technology planned in CERP.

The three other authorized CERP pilot projects will have their project management plans completed in 2001. These projects are In-ground Reservoir Technology, L-31N Seepage Management and Wastewater Reuse Technology. The In-ground Reservoir Pilot Project will determine whether two full-scale Lake Belt Storage Area components can be successfully constructed and operated to supply environmental and water supply deliveries. The L-31 North Seepage Management Pilot Project will explore ways to improve water deliveries to the Northeast Shark River Slough and restore wetland hydropatterns in Everglades National Park by reducing levee and groundwater seepage and increasing sheetflow. The Wastewater Reuse Technology Pilot Project will determine the ecological effects of using superior, advance-treated reclaimed water to replace and augment freshwater flows to the Bird Drive estuarine wetlands and Biscayne Bay. **Figure 7-1** shows the generalized locations of the pilot projects. Pilot Project Technical Data Reports will provide the technical basis for proceeding, and at what scale, or not proceeding with the project the pilot study is designed to investigate and evaluate.

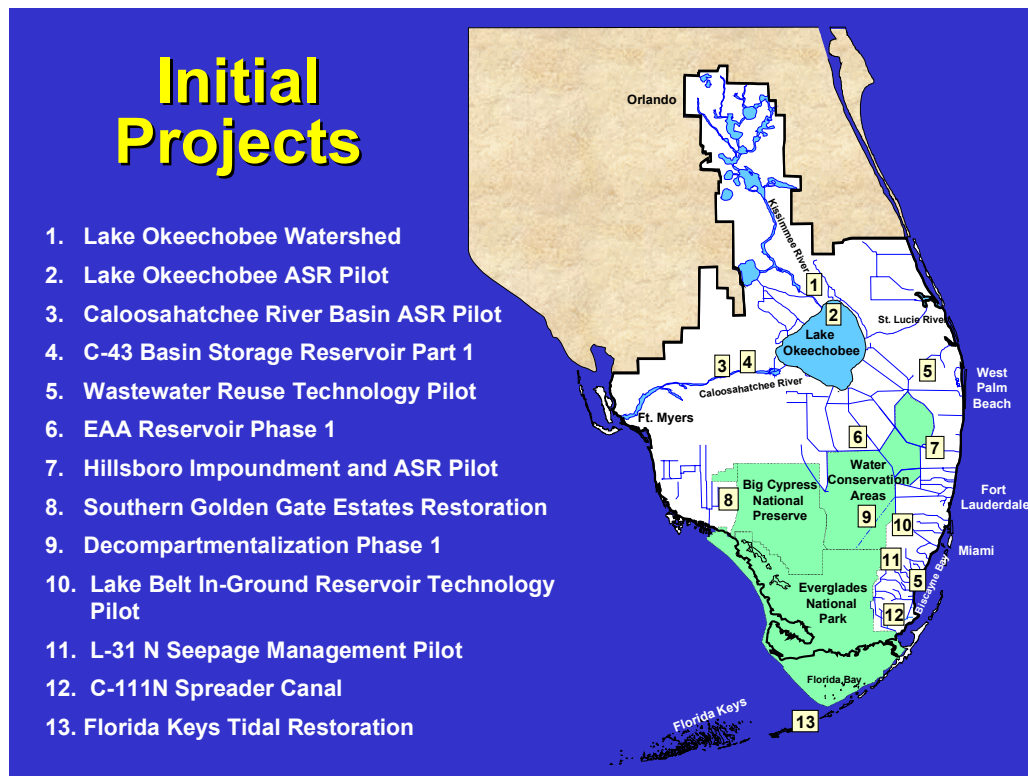


Figure 7-1. Generalized Location of Initial Projects

Feasibility Studies

There are four active feasibility studies, two of which are nearing completion. The Indian River Lagoon and Water Preserve Areas feasibility studies, reported on in the *2001 Everglades Consolidated Report*, are scheduled for completion in winter 2001.

A project management plan has been completed for the Southwest Florida Feasibility Study. This study will identify water resources related problems and opportunities and provide a framework to address the health of aquatic ecosystems, water flows, water quality, water supply, flood protection, wildlife, biological diversity and natural habitat in Southwest Florida.

A project management plan for the Florida Bay and Florida Keys Feasibility Study will be completed during 2001. The Florida Bay and Florida Keys Feasibility Study will determine the types of modifications needed to successfully restore and protect the water quality and ecological conditions of the bay and Keys reef tract. **Figure 7-2** shows the boundaries of the feasibility studies.

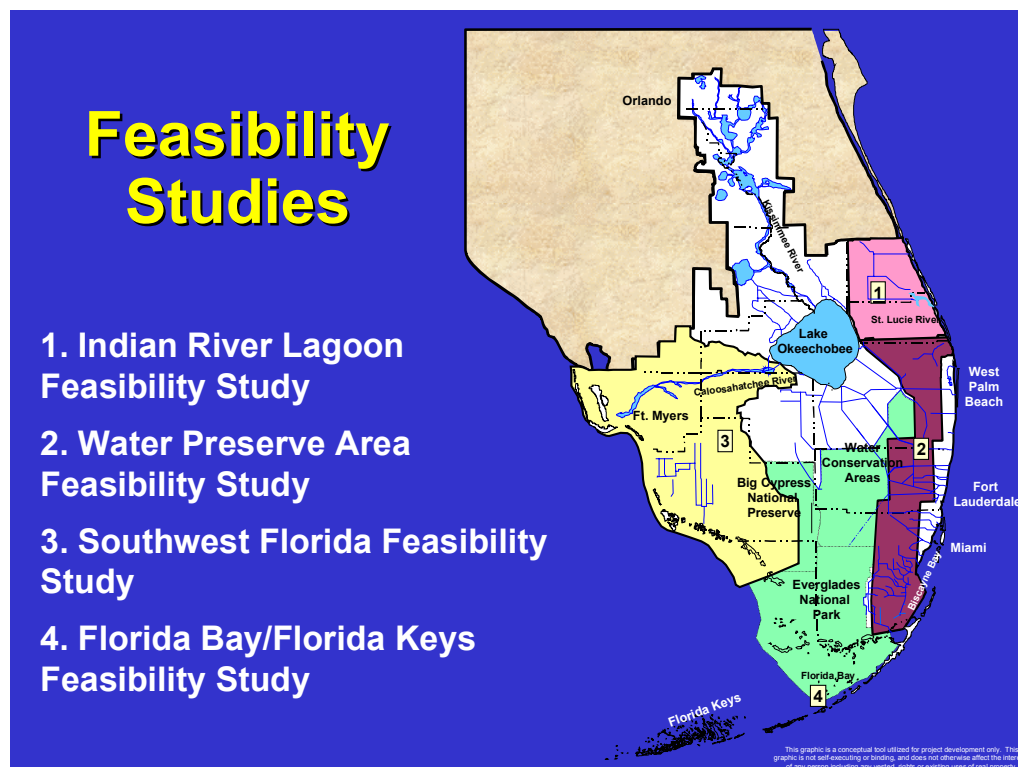


Figure 7-2. Boundaries of Feasibility Studies

Project Implementation Reports for CERP Construction Projects

Project management plans for two of the projects in this section, the Lake Okeechobee Watershed Project and the Southern Golden Gate Estates Restoration Project, have been finalized and approved.

Lake Okeechobee Watershed Project: This project will reduce phosphorus discharge into Lake Okeechobee from the watershed to the north, attenuate peak flows within the watershed and provide for more natural water levels. These goals will be accomplished through reservoirs, Stormwater Treatment Areas (STAs) and removal of phosphorus from 10 miles of primary canals.

Southern Golden Gate Estates Restoration Project: The objective of this project is to re-establish historic flowways, sheetflow and hydroperiods of wetlands, reduce point discharges to improve the health and productivity of downstream estuaries, improve aquifer recharge for water supply and prevent saltwater intrusion, and maintain flood protection. A conceptual restoration plan has been developed for this project. The primary components of the plan are land acquisition, construction of spreader channels, canal plugs, road removal and regrading, and pumping stations. Further, an ecological and hydrological monitoring program will be initiated to determine the effectiveness of the project.

Project management plans will be completed during 2001 for five other CERP projects: C-43 Basin Storage Reservoir Part 1, Everglades Agricultural Area (EAA) Storage Reservoir Phase 1,

C-111 North Spreader Canal Project, Water Conservation Area (WCA) 3 Decompartmentalization Phase 1, and Florida Keys Tidal Restoration.

The C-43 Basin Storage Reservoir Part 1 Project involves design and construction of aboveground reservoirs in the C-43 Basin to capture basin runoff and water releases from Lake Okeechobee. Facilities will be designed for water supply benefits, some flood attenuation, to provide environmental water supply deliveries to the Caloosahatchee Estuary, and water quality benefits to reduce salinity and nutrient impacts of runoff to the estuary.

The EAA Storage Reservoir Phase 1 Project has two components: (1) conveyance capacity increases for Miami, North New River, Boles and Cross Canals, and (2) an aboveground reservoir. This reservoir will provide for: (1) irrigation requirements in the EAA, (2) environmental deliveries of water to the WCAs, (3) storage of regulatory releases from Lake Okeechobee, and (4) increased flood protection within the EAA.

The C-111 North Spreader Canal Project alters the design for the C-111 project by adding a number of enhancements, including constructing an STA, enlarging the pump station, extending the spreader canal approximately two miles and installing culverts under U.S. Highway 1 and Card Sound Road. The WCA-3 Decompartmentalization Phase 1 Project will reestablish the ecological and hydrologic connection of WCA-3A and Everglades National Park (ENP). The Florida Keys Tidal Restoration Project is investigating the installation of four culverts on U.S. Highway 1 between mile markers 54 and 56 to help restore the tidal connection between Florida Bay and the Atlantic Ocean. **Figure 7-1** shows the general locations of these projects.

RESTORATION COORDINATION AND VERIFICATION

The Water Resources Development Act of 2000 authorized 10 years of an Adaptive Assessment and Monitoring Program to assess and monitor the success of CERP implementation in meeting the goals and objectives of the plan. RECOVER's role is to implement this program, as well as organize and apply scientific and technical information in ways that are most effective in supporting CERP objectives. While RECOVER is an interdisciplinary, interagency body, responsibility for RECOVER rests jointly with the USACE and the District. RECOVER links science and the tools of science to a set of system-wide planning, evaluation and assessment tasks. RECOVER's objectives are:

- Evaluate and assess, through modeling and monitoring, Comprehensive Plan performance
- Provide options for refinements and improvements in the design and operations of the plan during advanced plan formulation, design, construction and monitoring phases of implementation
- Review the effects that other projects may have on the performance of the Comprehensive Plan
- Ensure that a system-wide perspective is maintained throughout the restoration process
- Develop a consensus among South Florida resource agencies and affected interests regarding scientific and technical aspects of the Comprehensive Plan.

To establish and maintain an effective link between science and CERP, the Central and Southern Florida Project Restudy Team created a process known as the applied science strategy. RECOVER is responsible for the coordination and application of the components of the applied science strategy during the multiyear implementation of CERP. The major components of the strategy are conceptual ecological models, performance measures and restoration targets, a system-wide monitoring and assessment program and an adaptive assessment protocol. **Figure 7-3** depicts these components. Adaptive assessment is further described in the Monitoring and Assessment Plan section of this chapter.

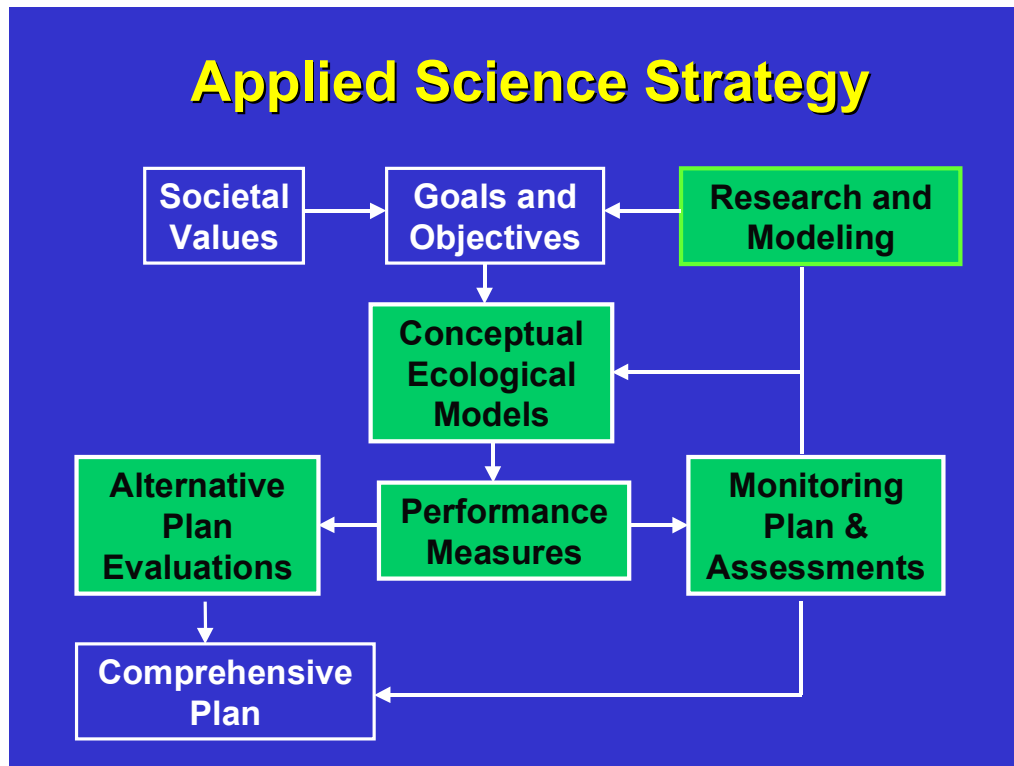


Figure 7-3. Major Components of Applied Science Strategy

RECOVER ORGANIZATION

To meet RECOVER objectives and ensure the successful application of all elements of the applied science strategy, RECOVER is organized into six task teams and one overall leadership group. The organization of each of these seven teams is both interagency and interdisciplinary. This organization will be maximally effective in applying the strength of scientific, technical and operational expertise that exists throughout the Florida resource agencies during the implementation of CERP.

While the Leadership Group is chaired by the USACE and the District, each task team is jointly led by federal and state agency tri-chairs, who represent the primary research, monitoring, modeling and operational organizations in the USACE, District and other participating agencies, who also bring strong professional credentials to RECOVER. This organizational structure is designed to:

- Promote technical consensus across multiagency lines
- Provide direct links between RECOVER and the supporting scientific and technical organizations in the USACE, District and other participating agencies
- Establish an open process that promotes scientific contributions to the Comprehensive Plan.

More information regarding the RECOVER teams is provided in the RECOVER management plan. **Figure 7-4** shows the major activities of the RECOVER teams.

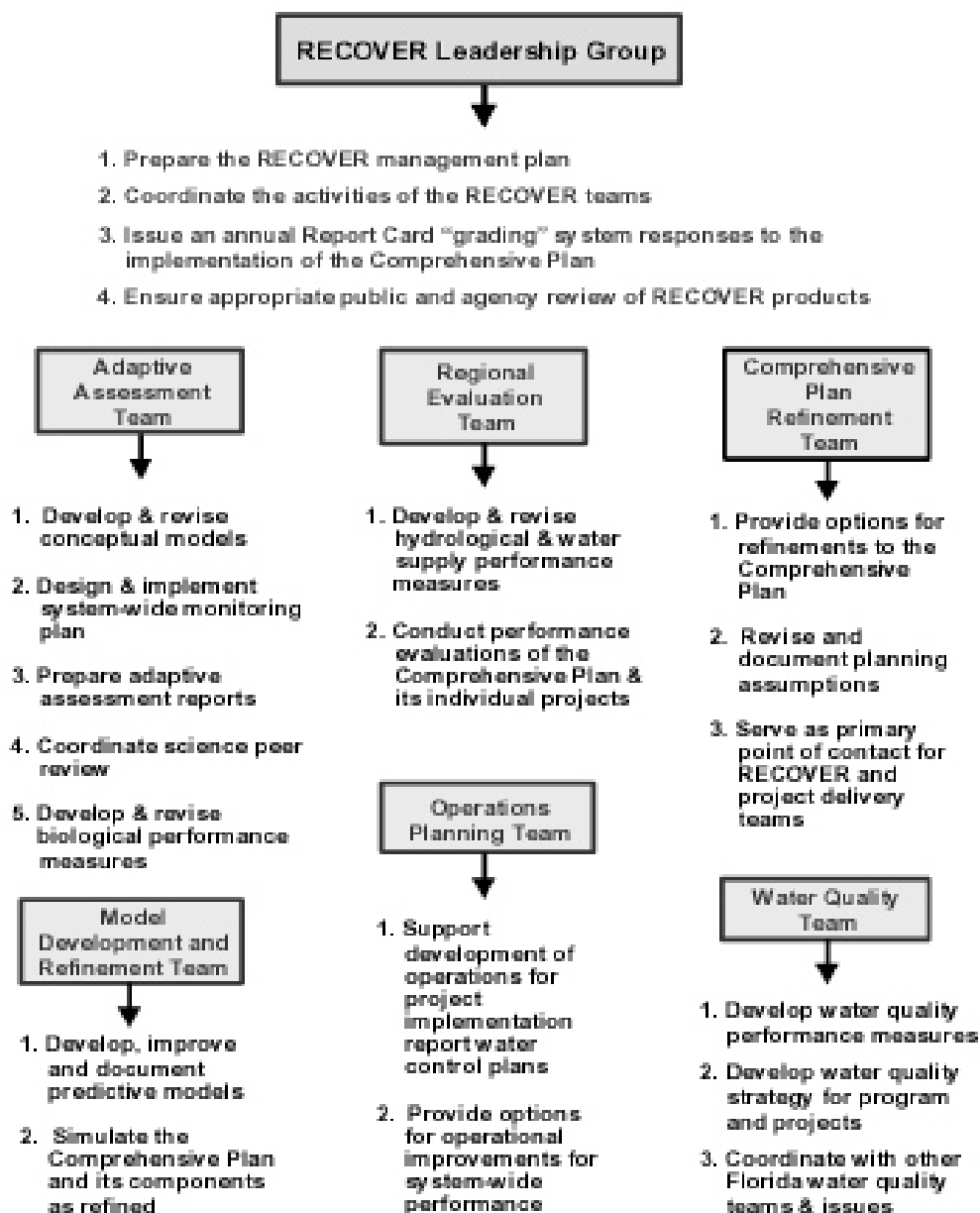


Figure 7-4. RECOVER Teams and Their Major Activities

RECOVER ACTIVITIES

Management Plan for Restoration Coordination and Verification

Management plans for all CERP activities are a requirement of the Master Program Management Plan (USACE, SFWMD, May 2001). Management plans outline which tasks are to be accomplished, when they will be accomplished, which of the sponsoring agencies are responsible for the tasks and what the tasks will cost. Development of the RECOVER Management Plan was the responsibility of the Leadership Group and began in late fall 2000. For budgetary purposes, the plan covers fiscal years 2001 through 2003. The plan will be updated annually, as necessary, to include a further year's budget estimates. It was developed with opportunities for public and stakeholder involvement and was approved in May 2001. The RECOVER management plan is available at www.evergladesplan.org.

Memorandum of Understanding

Membership on RECOVER teams is extended to federal, state and local agencies and tribal governments in South Florida. To more formally recognize the purpose and interagency process of RECOVER, to help all participating agencies better understand the expectations and benefits of participation in RECOVER and to lay out a set of principles and operating guidelines for how RECOVER teams will function, a Memorandum of Understanding (MOU), or partnership agreement, has been drafted. The agreement lays out a process whereby the partnering agencies can more effectively cooperate in integrating their collective scientific and technical expertise and activities in support of CERP goals and for representing each agency's perspectives regarding scientific and technical matters pertaining to the Comprehensive Plan. Because no agency in South Florida has the full range of capabilities necessary to meet these needs, each agency needs to have a forum for contributing its expertise and perspective to the total effort.

The memorandum recognizes that the restoration effort's success level will be increased, and that the agencies and public will benefit, through a unified scientific effort in support of the Comprehensive Plan. Improvements in coordination and the exchange of scientific information among the agencies will lead to greater understanding regarding scientific issues and restoration objectives and will contribute to reductions in uncertainty associated with large, complex ecosystems. Improved collaboration and agreement among the agencies regarding the application of scientific support to the Comprehensive Plan should strengthen the public trust in the plan's ability to meet its objectives.

Following review and comment by the participating agencies, the District and USACE will sign the agreement, thereby making it active and available for signature by the participating agencies. The MOU is provided in **Appendix 7-1**.

Annual CERP Report Card

The magnitude of the restoration program and the political and financial commitment that will be needed to see it through to completion require that the people of Florida and the nation be regularly informed on the progress being made toward meeting the plan's goals and objectives. To provide this measure of success throughout the implementation of the Comprehensive Plan, an annual CERP Report Card will be issued. The Report Card will use a set of key indicators of environmental health for both natural and human systems in South Florida as a way of informing the public and decision makers on the success of plan implementation. The key indicators used to

illustrate the Report Card have been selected from a large set of technical performance measures contained within the draft Monitoring and Assessment Plan (below).

The criteria used to select indicators from the draft Monitoring and Assessment Plan to report on in the Report Card included:

- Will it respond to CERP?
- Will it be measured by the monitoring plan?
- Does it reflect CERP goals and objectives?
- Does it provide useful information?
- Is it currently measured (and are there at least three data points)?
- Do the set of indicators represent all regions?

Data gathered from research and monitoring will be used to develop the Report Card. The first annual Report Card will be issued in winter 2002 and builds on the *1999 Baseline Report for the Comprehensive Everglades Restoration Plan*. The Baseline Report is available online at www.evergladesplan.org.

Conceptual Ecological Models

Conceptual Ecological Models form a major component of the applied science strategy. Nine models have been created, representing the major wetland physiographic regions of South Florida. The models are nonquantitative but have been a means for developing consensus as to the cause-and-effect relationships that explain the effects of anthropogenic stresses on South Florida's wetland systems. The models identify the ecological elements – attributes – that indicate the health of the natural system. They also delineate the ecological linkages between the stressors and the attributes and the most appropriate measures for each attribute. The models have provided a means for converting broad policy-level objectives established for the Comprehensive Plan into specific measurable indicators of the health of the greater Everglades ecosystem, and a means to develop a suite of working hypotheses that predict ecological responses to the implementation of the plan. The rationale behind the development of CERP was that the plan should focus on correcting the stressors identified in the conceptual models, as the models represent the consensus opinion of scientists regarding the most important attributes and causal links in the degraded natural system.

The models serve as the basis for the development of performance measures that collectively are representative indicators of the system-wide responses to restoration at a range of spatial and temporal scales. The performance measures developed are used as the standards for evaluating the success of the restoration program. The measures also are used to design a regional monitoring and assessment program.

The original suite of models was developed and reviewed by over 100 scientists and resource managers who participated in a concentrated program of workshops between Fall 1996 and Spring 1997. The models underwent a second review and revision during Summer and Fall 2000. Models have been developed for Lake Okeechobee, the Caloosahatchee Estuary, the St. Lucie Estuary, the Ridge and Slough Everglades, the Big Cypress Basin, the Southern Everglades Marl

Prairies and Rocky Glades, the Mangrove Estuarine Transition Zone, Florida Bay and Biscayne Bay. A total system model is in preparation.

Monitoring and Assessment Plan

A draft Monitoring and Assessment plan for CERP was developed over winter 2000 and spring 2001 by RECOVER team members. The primary purpose of the monitoring and assessment plan is to describe the performance measures and parameters of the natural and human systems in South Florida that should be measured to determine the Comprehensive Plan's success. The goal is to create an integrated, system-wide program that will be used and supported by all participating agencies to track and measure implementation progress.

The draft plan identifies a specific set of physical, chemical and biological performance measures that should be monitored. It is required to determine whether the Comprehensive Plan achieves the objectives of recovering healthy and sustainable ecosystems throughout South Florida and improving the human environment. The plan will also support an adaptive assessment process for refining and improving the design and operation of CERP throughout its implementation.

Adaptive assessment provides much needed new information by measuring how the systems respond to manipulations and by using this new information to improve the design and implementation strategy for restoration projects. Adaptive assessment is "learning by doing" and provides the most effective means for acknowledging and reducing the large uncertainties pertaining to program design and system responses that inevitably are part of ecosystem restoration programs. Successful application of the adaptive assessment process will require the interaction of scientists, resource managers, policy makers and the public in addressing options from RECOVER for alterations in CERP for the purpose of resolving performance problems or for improving the restoration plan's overall performance. The intersection of the knowledge and views of these three groups will be where the restoration plan has the only chance of being successful. Scientists and resource specialists provide updated information on the ecological goals and on potential solutions to performance problems within the context of CERP. Management and policymakers provide agency perspectives and represent what is possible and practical with the implementation and redesign of CERP. The public provides independent review and the perspective of regional stakeholders. Incorporating these groups' views into the decision-making process for alterations in CERP will be critical to the restoration program's long-term success. **Figure 7-5** shows the elements of the adaptive assessment program.

The draft monitoring and assessment plan is organized into five sections. Section I, Introduction and Background, provides a broad overview of the plan's purpose, how it was created and how it should be applied. Section II contains the narrative descriptions and flow diagrams for the set of nine conceptual ecological models. These models provide the technical foundation for most of the natural system performance measures that have been incorporated into the monitoring plan. Section III contains the technical documentation sheets for each CERP performance measure that comprises the monitoring plan. Section III includes a description of the process used to develop and screen the biologic, hydrologic and water quality performance measures comprising the monitoring and assessment plan. Section IV is a preliminary summary of the uncertainties associated with the hypotheses in the conceptual ecological models, and a recommendation for research needs in support of the Comprehensive Plan.

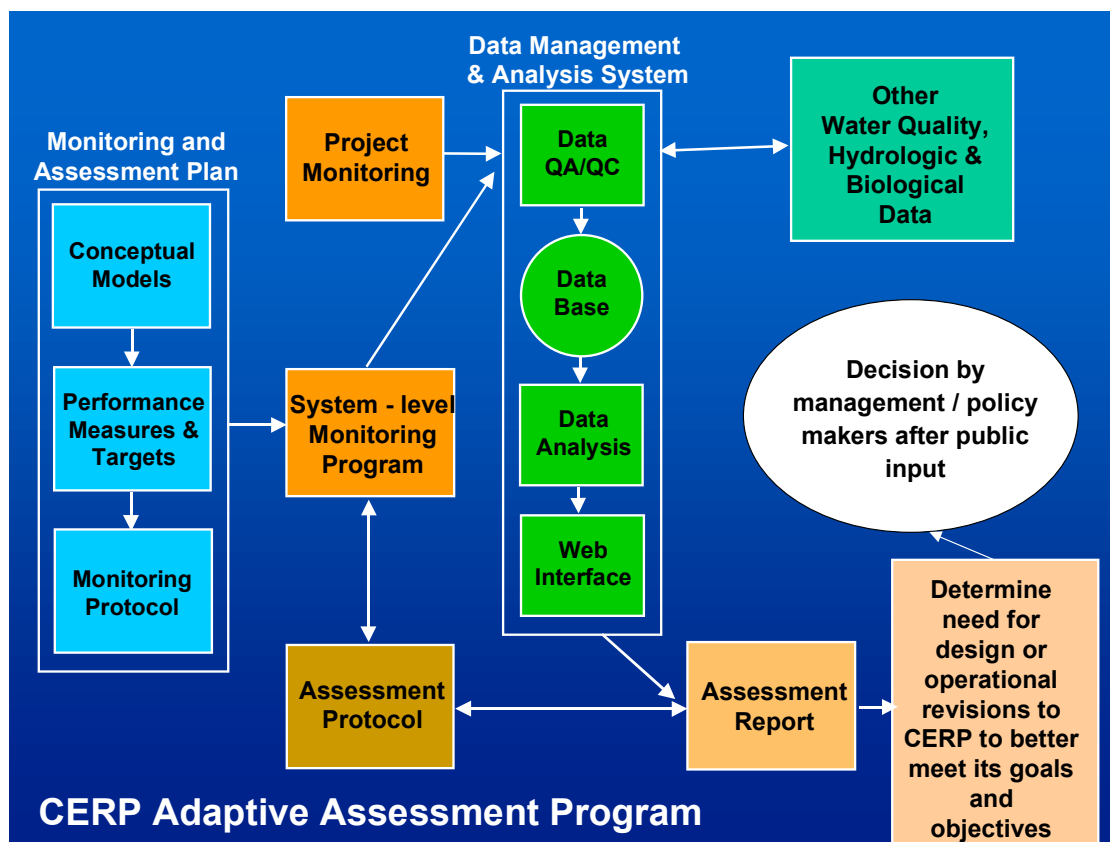


Figure 7-5. CERP Adaptive Assessment Program

The development of the monitoring and assessment plan will follow an iterative process. During late spring and summer 2001, the plan underwent public and agency review. In late fall 2001, the Committee on the Restoration of the Greater Everglades Ecosystem (CROGEE) of the National Academy of Sciences will review the plan and the adaptive assessment protocol. A second draft of the plan that incorporates these review comments will be issued in February 2002. Supporting documents currently in preparation will supplement the draft plan. These documents consist of: (1) an implementation strategy, (2) a network and sampling design, (3) an adaptive assessment protocol, (4) a research needs document, and (5) a data management plan. Implementation of the plan is envisioned to be a phased effort, focusing initially on inventorying existing monitoring efforts and available baseline data and identifying gaps in monitoring baseline data needed to complete the monitoring program.

RECOVER Protocols

The Comprehensive Plan consists of more than 60 different components to be implemented over a multiyear time frame. To ensure that a system-wide perspective is maintained during the implementation period and that the plan's objectives are met, the RECOVER concept was created. The uniqueness and complexity of the RECOVER tasks suggest that standard operating procedures, or protocol papers, are developed. Protocol papers that have been identified and are in preparation include:

- *Adaptive Assessment Protocol* – to describe how annual assessments will be conducted using results from the monitoring and assessment plan and how it will be determined that the restoration program is moving in the right direction. The lead team is the Adaptive Assessment Team.
- *South Florida Water Management Model (SFWMM) Update Protocol* – to describe how and when the SFWMM will be updated, either the model itself or data sets to the model, and how model changes will be documented and notice made. The lead team is the Model Refinement Team.
- *Project Evaluation Protocol* – to describe how the individual project teams will determine the “without project” condition for the individual projects, how project benefits will be calculated, and how to determine the quantification and quality of water from a project. The lead team is the Comprehensive Plan Refinement Team.
- *CERP Update Protocol* – to describe how and when the Comprehensive Plan will be updated or reformulated and the mechanism through which changes will be conveyed. The lead team is the Comprehensive Plan Refinement Team.
- *System-wide Interim Operations Protocol* – to describe a process for developing system-wide interim operating plans, how the plans may be implemented and how and when they will be modified. The lead team is the Operations Planning Team.
- *Regional Evaluations Protocol* – to describe how individual project alternative plans will be evaluated within the system-wide context and how these evaluations will be documented. The lead team is the Regional Evaluation Team.
- *Performance Measure Protocol* – to describe how revisions to performance measures will be made and determine the criteria upon which revisions will be made. The lead team is the Regional Evaluation Team.
- *Interim Goals Protocol* – to describe the process for establishing interim biological, water quality and hydrological goals of restoration success. The lead team is the RECOVER Leadership Group.

While each of the RECOVER teams has a lead role in drafting the protocols, it is understood that the protocols are interrelated. **Figure 7-6** shows these relationships.

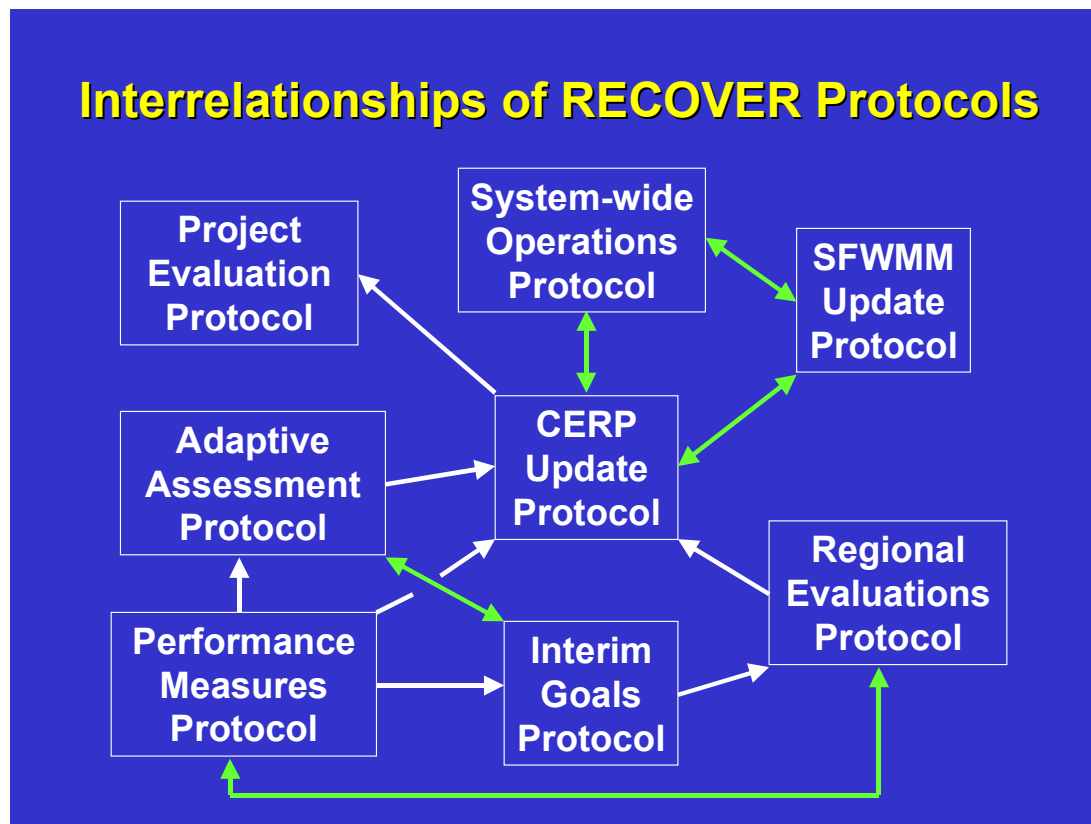


Figure 7-6. Interrelationships of RECOVER Protocols

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